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ABSTRACT

This document is an outline of a project to develop, evaluate, and disseminate a set of curriculum materials for use in the elementary (K-6) grades. This paper sketches the role of schools in the energy problem, outlines goals and objectives for curriculum activities, and develops a plan for the content and use of the materials. Strategies for both dissemination and evaluation are discussed. Finally, it points out some links between this project and other efforts in the field, both in and outside of schools. (TM)

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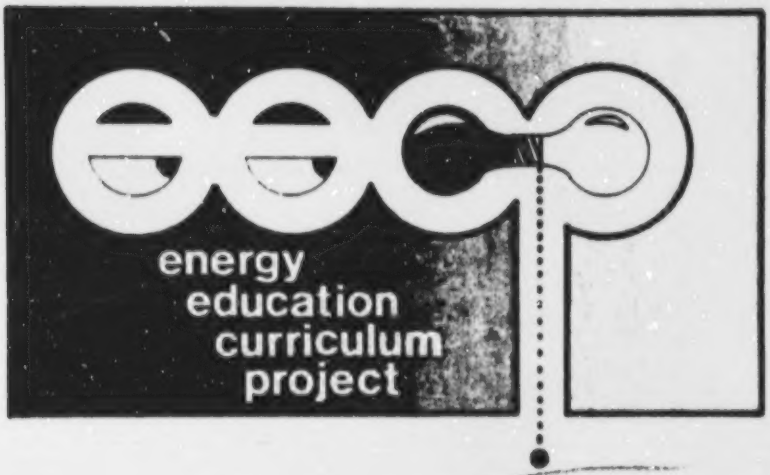

A PLAN FOR AN ENERGY CURRICULUM FOR THE ELEMENTARY GRADES

SE 025 404

A PLAN FOR AN ENERGY CURRICULUM

FOR THE ELEMENTARY GRADES

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Most of us can point to some part of our lives that involves avoidance behavior. We postpone a medical checkup. We "forget" to vote in local elections. We tune out fairly explicit messages from our family that a vacation is long overdue. Until we arrive at the hospital emergency room, we are scandalized by political corruption, or we are threatened by family exile, we do not normally act. We all do it. Avoidance is a common pattern in our lives. We must set priorities, for there is only so much attention we can give to a wide range of problems.

One such avoidance problem is currently being confronted in the Gillespie household. We have what we would call a "car problem." Approximately four years ago, we decided we would buy two small cars that were low gas consumers. This decision, we thought, was a sensible one for two working adults with an above average income.

For four years we successfully avoided messages from the White House, the media, and friends about the energy costs of driving two cars. Then one evening we watched a PBS program on the energy situation which dramatically raised the issue of fuel consumption. Our seemingly sensible decision came directly into question. A debate began to brew. Were we guilty of over-consumption? We felt guilty, but we also needed to be concerned about landscaping our back yard, fixing our plumbing, and planning our long overdue vacation. We hesitated.

Slowly, our guilt began to surface. Questions persisted in our dinner conversation. We began real discussion about our car problem. We finally focused on the question of whether to drive only one car the fifteen miles we must go to work everyday. In order to do this, we would need to coordinate activities between two academics who value their freedom to work and write in settings that are most profitable to their success.

Our cars had become part of our identity. Our self images rested on having free access to transportation.

Over a period of six months, many hours of discussion and debate went into our decision to drive only one car to work. Compromises were achieved over times transportation would be available. Working patterns were reestablished. Finally, we gave our decision a one-week trial period. It worked. We are now a two-car family with a one-car life style. The decision has brought us pride, for a price. We have made major adjustments in our work patterns, and our bathtub continues to leak water into our family room.

Some people would argue that the energy crisis is so bad that the Gillespies have only scratched the surface of the problem. They really should not drive at all. If they had any energy consciousness, they would find an alternate form of transportation, or move to the Bloomington city center. Walking fifteen miles to work is one solution. Bicycling or forming a car pool with others who live relatively near are also alternatives.

Most people would probably not think about the problem at all. As a recent national Gallup survey demonstrates, 42 percent of the American people think the energy situation is "only fairly serious." Fourteen percent say it is "not at all serious." Specifically, 31 percent feel that reducing the amount of driving is "not at all important."[1] Others point out the problems in significantly cutting their driving mileage. Essentially, they have other priorities.

It is the contention here that the energy problem is basically one of avoidance for most of the American public. People hear about the need for energy conservation through the media. They tune out these messages

as problems of work, home, and school appear more pressing. Fuel becomes more expensive. Brownouts increase. Model solar homes dot communities. Still most people push the problem aside for today, and most likely tomorrow.

Because of this avoidance, solutions to the energy problem must focus on changing patterns of people's everyday lives, and priorities for energy conservation and the use of alternative technologies must be raised. The President cannot change these patterns and priorities, at least not alone. The people must. And they must start now.

Workable compromises need to be established. Americans will not give up cars overnight. They will not turn off all their lights tomorrow. Intensive energy consumption is, indeed, part of their self-identity and a pattern in their everyday lives. Energy is a real problem. It needs to be handled in realistic ways. Solutions must deal with both the psychological and political dimensions of the issue. Compromises must be cultivated based on where people are, both psychologically and physically at this point in time, and where they need to go in the very near future.

If we believe that the problem is essentially one of changing priorities and life style patterns, then energy education rests at the core of the problem-solving process. Policy pronouncements help, but the 55 mile per hour speed limit continues to be flagrantly violated. Economic incentives help, but heating bills in most homes continue to rise, and are generally paid. Coal strikes raise the visibility of the problem, at least for those who are less creative than some third-grade students in an Indiana school; they put ice cold cloths on their thermostat in order to raise their classroom temperature.

Education is important because establishing and changing behavior

patterns are the essence of its definition. The current Commissioner of Education, Ernest L. Boyer, puts it this way:

> "The energy crisis we now face will require not only new technology, but new values and new attitudes as well. We must change our habits of consumption. We must approach self-indulgence with a new perspective--an understanding that we are members of a human community, with a common plight and a common fate. And all of this is closely tied to our nation's schools and colleges."[2]

Indeed, the need is one of human survival, and the schools have a major role to play.

Here we will deal with one small, but siginficant, part of the need for energy education. We will outline a plan for the work of the Energy Education Curriculum Project. This project aims to develop, evaluate, and disseminate a set of curriculum materials for use in the elementary (K-6) grades. It begins at the beginning, at least as far as most schools are concerned.

This particular paper serves as a foundation for the Project. A sketch of the role of schools in the energy problem will first be undertaken. Goals and objectives will be outlined for the curriculum activities. A plan for the content and use of the materials will then be developed. Both dissemination and evaluation strategies will be discussed. In conclusion, the paper will present some necessary links between this strategy and other needed efforts in the field, both in and outside of schools.

As such, the paper will serve as a working document. Hopefully, the ideas presented here will be revised and reshaped as more people provide important insights into its strengths and weaknesses and as development evaluation, and dissemination activity gives us a test in the "real" world of a wide range of schools and communities.

The Energy Problem and the Role of Schools

There is a dialogue that Robert Weissberg uses in his discussion of problems in studying political socialization. It can easily be adapted to the study of the energy problem. The scene involves a city street in the late evening hours. A drunk has lost his car keys, and he is crawling around the base of a street light trying to find them. A police officer approaches him, and the following dialogue ensues:

Police Officer:	What are you looking for?
Drunk:	My car keys.
Police Officer:	Where did you lose them?
Drunk:	Over by my car.
Police Officer:	Then why look here?
Drunk:	There's more light here.[3]

It seems to us that many people who are seeking solutions to the energy problem are looking where the light is (pun intended). Our argument is that we need to do some poking around in dark areas in order to find some useful solutions to the very real problem on our hands. Hopefully, people with clear vision of the energy problem will bring flashlights to the scene. We have much of the necessary intellectual and technical knowledge. The pressing problem is to use it in creative and less obvious ways.

People who have been seeking solutions to the energy problem have surely been working hard in familiar, lighted places. They have been looking to the Congress for an energy policy for the country. They have been looking to the media in order to make the American public aware. They have focused on energy; energy resources and their use. Energy is a natural enough focus, but one which is in the light rather than in the dark where some equally, if not more, important insights lie.

Our thesis here is that the energy problem is not totally, or even mostly, a problem of energy. It is largely a problem of people. Energy resources and their use is one facet of the problem, but its core is found in people's attitudes and behaviors. Solutions to the problem of changing attitudes and behaviors rest in a dark area. Researchers know something about change processes.[4] Practitioners rarely put this knowledge to use. The public generally thinks we can do very little about people's everyday life style patterns. However, it is here where some important solutions lie, and it is here where this particular paper will focus.

Schools have been charged with changing people's attitudes and behaviors throughout their history. Specifically, they have aimed at developing knowledge, skills, and attitudes necessary to effectively meet our nation's goals by training future leaders, as well as technicians, bureaucrats, and citizens. They have approached problems at their roots with long-run solutions. They have focused on our youth.

Schools have successfully met some major challenges. The problem of schools in their early years was to change the attitudes and behavior of immigrants -- to make them good American citizens. They accomplished this task well, though some would argue with both the goal and the method. During the Sputnik era, schools responded to political and technological needs by training youth to be scientific inquirers and to fill necessary positions in industry. Their success stimulated much of the technological growth about which we are now concerned.

Lately, schools are once again being held accountable for teaching students to read and write so that they can function effectively in American society. The return to "basics," competency testing and the registri-

bution of school finances will most probably promote the attainment of this goal, along with intended and unintended changes in attitudes and behavior patterns of our nation's youth.[5] Once again, schools will succeed in problem-solving in "dark" areas.

The role of schools in the energy problem, then, is to focus on the socialization of youth into useful attitudes and behaviors about energy. The nation's youth need to be informed about energy sources, their use and their impact. They need to see models of energy conservation in their teachers and their school settings, as well as in their family and community. Most of all, they need to have experiences in school linked to experiences in other settings which will demonstrate the viability of new patterns of energy use.

These roles of information, dissemination, modeling, and providing community-based experiences are not new to the schools. They are not very well executed in many areas, but the task is not impossible.[6] They can be effectively carried out in the energy area. One can argue the energy problem is so pressing that an effort equal to socializing immigrants or teaching the nation's youth about science in reaction to Sputnik is absolutely essential. It surely is not difficult to argue that energy education is a "basic." Without it, our very survival is threatened.

The specific curricular needs in energy education are numerous. There have been several studies done of energy education materials, specifically those provided by states. Jones and Steinbrink have found that energy materials exist in practically every one of the fifty states, but they are riddled with problems of conceptualization and implementation.[7] Based on this study and others, there are five curricular needs on which we will focus in planning our elementary materials. Each will be discussed

below.

Because we believe that the energy problem is one of people, and not necessarily energy per se, the curriculum materials need to be student-centered. Instruction needs to focus on students' patterns of everyday living and their attitudes about energy consumption. It needs to demonstrate how students are making choices and decisions on an everyday basis which affect the global energy situation. New student habits and attitudes need to be the core objectives for the curriculum. Concrete, hands-on activities which can be replicated and adapted to individual students' everyday lives need to be developed.

A second instructional need is a focus on awareness. Most curriculum materials do not present a series of well-designed lessons aimed at creating basic awareness about the energy problem.[8] If priorities are to be set in students' lives, a range of activities need to be created which are both dramatic and inspiring, which can place energy at a high priority level early. Without such awareness, all of the knowledge and skills which are taught in the curriculum will assume secondary importance compared to other problems in which students have more interest, more awareness, and more concern. Establishing energy awareness as a first priority is a hard and difficult task (remember the Gillespies). One "flashy" lesson will not do the job. Sustained, comprehensive attempts must be made throughout an entire curriculum. In effect, awareness must be a first priority of curriculum development if instructional materials are to be successful.

The third curricular need is now obvious. Materials need to focus on some basic skills in inquiry and participation in order for true patterns or habits to be established. Most materials assume skills, and focus on

knowledge about energy. Our curriculum materials will have a major focus on inquiry skills such as asking questions and gathering evidence, as well as everyday participation patterns by young energy consumers. Knowledge will not be shortchanged, it is key for action in any area. Yet without skills in using knowledge to think and to act, the chances of impact are minimal.[9]

Fourth, because we are interested in influencing students' everyday lives, we will attempt to present the energy problem both in terms of individual roles and work in groups. Since social studies has commonly been concerned with political and social issues, we will attempt to teach students about their roles as individuals and as political and social actors, or group actors, within everyday community, state, national, and international settings. We will attempt to link activities from the school to the family, the work place, the church, and other community organizations in order to provide a cement for the transfer of students' knowledge and understanding into a variety of facets of everyday living, both private and public.

Finally, we will attempt to link the curriculum materials to the standard elementary curriculum in important ways. Most elementary teachers focus on reading, writing, and math. We aim to develop social studies/science materials. These subjects are stepchildren of other interests in many elementary classrooms. Therefore, we must develop materials which can be used in the teaching of these major subjects, while teaching about the energy problem. These linkages are not easy or simple. They are complex and difficult to draw. Yet the use of the materials may very well rest on their linkage to standard subjects taught in the elementary curriculum. Core social studies/science lessons will be developed which are

not only linked, but provide direct applications in fundamental reading, writing, and math subjects.

You might think that we have wound our way far afield from the police officer and the drunk talking under the street light. We really haven't. Remember the drunk was claiming that there was more light where he was searching. The drunk had made this claim many times before. The police officer was growing weary of taking the drunk to "the tank" every night. Given our discussion, we might finish the dialogue as follows:

Drunk:	There is more light here.
Police Officer:	You are right. You were right last night, and the night before.
Drunk:	You are going to take me in again, aren't you!
Police Officer:	No. First I am going to use my flashlight, and we'll go over there in the dark and find your car keys.
Drunk:	Really?
Police Officer:	Yes. Then I will drive you home. We'll have a cup of coffee, and we'll talk about your drinking and driving habits.
Drunk:	What?
Police Officer:	Your habits. That's your real problem, my friend. Your car keys are only one obvious symptom. We'll get them first, and then go home and talk about changing your habits.
Drunk:	That will be difficult. Very difficult.
Police Officer:	True. But we can work at it. We'll start with the coffee and the talk. I have some ideas, and I know some people who can help you. We may find we both like it better than standing under this street light every evening.

The dialog is fictional. Yet the steps it illustrates are essential. The police officer is right. First, we must step into the dark. We must begin where people's needs are. Then, we must use ideas and trained people to change basic habits. If we succeed, we will like it better because we will overcome some persistent problems.

The drunk is right, too. It will be difficult. Very difficult.

Curriculum Goals and Objectives

There are a wide range of goals and objectives which could be developed for any energy education effort. What is disconcerting about most guidelines that are set out by states, private organizations, or the schools themselves, is that they lack an integrated conceptualization of what they are about. There is no image of the personal or societal outcomes which should result from the materials.[10] There are a set of informational and skill guidelines for which relatively isolated and independent activities are developed. The attempt here will be to develop a systematic conceptualization of an effective energy actor as the outcome of instruction and to delineate principal competencies such an actor must attain.

The conceptualization begins with an image of a person. We will call this person an "effective energy actor." In this case, the work "effective" means that a person has the awareness, knowledge, skills, and habits necessary both to conserve energy in his or her everyday life, and to understand and utilize new technologies and new energy sources. "Effective" means both thinking about energy problems and acting in relation to them. Without both thinking and doing, a person cannot be effective in relation to the energy problem

An "actor" who is effective is a conserver and a utilizer of new technologies. The word "actor" is important here. An individual is an actor as an individual. In this sense, an energy actor is a consumer of energy resources. People act individually every day to consume energy. An effective energy actor will, as an individual, be a conscientious consumer of energy resources.

Yet an effective energy actor is also a member of one or more groups. The group can be a school, family, community, work, and/or service group. In these settings, an effective energy actor acts as a citizen, or as a member of a group who needs to coordinate his or her actions with other group members. As a group, participants in school settings make conscious or unconscious decisions to use energy. As a group, families such as the Gillespies take actions which make an impact on the energy problem. An effective energy actor will work in a variety of these common groups to make decisions and take actions which help to solve energy problems.

Certainly, individuals can have an impact on the energy problem, if enough individuals are effective in their roles. Yet, ultimately, group action also makes a difference. Therefore, an effective energy actor is not only an effective individual consumer, but an effective citizen or member of a group. Both of these dimensions of energy activity are important to an energy actor's role.

A more concrete image of an effective energy actor can be drawn by considering the case of a typical consumer, who for our purposes can be named Carla. Carla Consumer is an accountant for a large corporation in her home town of Midville, Kansas. She is proud of her two elementary school children. She is also a not-so-bad actress in her local theater group, and a member of a citizen planning committee.

Carla is used to taking roles. In her office, she knows that efficiency and accuracy count, and she has saved the corporation thousands of dollars through the cost-saver plans she has initiated. She considers this to be an important part of account management. She also currently has a lead role in "Pygmalian," and after work she memorizes lines and rehearses her role as Eliza. She is finally reaching the point where she can easily and naturally assume Eliza's expressions, mannerisms and actions on stage.

Yet Carla assumes another role, one about which she once thought a lot, but has now become so natural she does not need to consciously make plans or memorize lines. When she rises in the morning, she turns on one light in her hall, and turns it off when she enters her kitchen. She uses one burner to cook her family's breakfast. She turns off the heat when she leaves the house. She participates in a car pool with three friends who must drive to work. As she reads a magazine during the drive, she learns more about the costs of installing solar heating, something she believes will be possible in her home.

Carla does not consciously think about her consumer role, because it has become part of a pattern in her life. She does, however, consider energy use an important concept for her two children to learn. She teaches, or preaches (according to her children), an energy ethic which she hopes will become as natural for them as it is for her. She is now teaching them the lines in a play which she considers to be as difficult, and even more important, than her role in "Pygmalion." She recognizes the similarities in the process of learning a role, and the high stakes involved. The whole family is participating in their "energy play."

Tonight Carla is also participating in a meeting of the Midville Energy Committee. They are drawing up a plan for energy use for the city.

They are asking hard questions about possible new alternative energy sources for homes and businesses. The city council will vote on their plan next week. Some community leaders are opposed to the plan, and the Committee is busy gathering information to support their ideas. Next Thursday evening will be a big night for Carla and the Committee. If they can get the plan approved and make it work, they will have a model for other Kansas communities.

Carla is an effective energy actor, regardless of the city council vote. In her everyday life, she exhibits at least four competencies which are important to her success. First, she is aware of the energy problem. She shows interest by her own individual actions and those activities she jointly undertakes with her fellow workers, her family and her community. She recognizes the need for conservation and careful consideration of alternative energy resources. She also cares. Concern is a very important component of the awareness competency.

A second characteristic of an effective energy actor involves information. An individual must be informed about energy resources, policy choices, and alternative actions that can be taken now and in the future. Such information is vital to competent thinking and action for an effective energy actor. Carla gains information through the media in the magazine she is reading, but also does more formal, systematic work to support the plan her energy committee is formulating.

Carla also shows important inquiry skill competencies. She knows how to ask good questions and collect evidence in order to think in well-grounded and systematic ways about a problem. She is doing this in her home and in her energy group. An individual also must recognize his or her own values and be able to apply these values to everyday energy situations.

Carla recognizes her own conservation values as she tries to clearly articulate them to her two children. She also recognizes the values of others as she tries to prepare for opposition in the city council meeting. These skills of analysis and valuing are key competencies for any effective action on the energy problem.

Finally, an effective energy actor such as Carla must have important habits of participation, both in everyday living and in group activity, which promote the conservation of energy and the use of new technologies. These participation habits involve her individual role as a consumer in a variety of conservation strategies. They also involve her group activity which promotes knowledge, awareness, and action in her community, and potentially in other communities, states, the nation, and global organizations and activities.

When these four general competencies -- awareness, information, inquiry skills, participation habits -- are integrated together they constitute the essential characteristics of an effective energy actor. Each competency is itself important. When they are combined, a powerful multiplier is put into place which maximizes the potential contribution an individual can make to as universal and significant a problem as the energy problem.

Carla Consumer is a model of an adult energy actor. As such, she represents a long term goal for an elementary school curriculum. We would surely not expect elementary students to be raising children, working as accountants or participating as members of the Midville Energy Committee. Common sense tells us that we must think carefully about preconditions which will stimulate long-run outcomes, not the outcomes themselves.

What, then, are reasonable preconditions for the development of

effective energy actors? Piaget and other researchers have demonstrated important developmental opportunities and barriers in the elementary years.[11] Students can develop energy awareness, as long as it is self-or peer-centered awareness. They can learn basic information if useful, concrete examples are provided from their everyday environment. They can begin to develop inquiry skills in terms of lower or middle level discrimination of ideas and objects. They can act in simple roles that are self-oriented (student as consumer, rather than Ralph Nader or President Carter). Real limits are placed on comprehension, analysis, abstraction and role-taking. Yet the opportunities are also great.

Our central thesis here will be that, given these real limits, students can <u>be</u> effective energy actors in their own everyday environment. They must <u>not</u> wait to <u>become</u> adults. In fact, the world will not wait for them. In theory, they need not wait; rather they can develop basic, very basic, attitudes and behaviors which will grow in dimensionality over time.

Consequently, our model must be scaled to the size of elementary school students. It need not be discarded or demonstrably changed. We can take Roger, a third grader, as an example. Roger is a young effective energy actor. He is aware of his own energy resources (physical, mental, emotional, etc.) and those around him. He cares about turning out lights at home and school. He raises questions about energy use in his community environment. He even participated in designing a conservation plan for his school.

Roger continuously practices what he believes. He walks to school and friends' houses. He tries to get others to do so. He participates in family decisions about energy use. He works with classmates to conserve energy at school. He talks with young (and older) friends about new ways to

confront concrete energy problems in his own everyday environment. He sets a model, and acts to improve energy situations wherever he sees them.

In these ways, Roger may have as much impact in his everyday world as Carla has in hers. Their approaches and methods, contexts and specific outcomes may well be different. Yet each is important now, as well as in the future.

Therefore, our main curriculum goal will be to provide instruction which will promote effective energy actors of which Carla (or Carl) Consumer is a future model and Roger is a current model for elementary students. Four sub-goals involve the development of competencies in awareness, information, inquiry skills, and participation habits. Each of these four sub-goals serve as a general domain for the development of specific instructional objectives. These objectives are highlighted in the chart on the following page. They are briefly described below.

Awareness. Certainly a person who is aware of the energy problem and roles that can be taken must initially have interest in the area. Interest creates motivation, which is the chief foundation for both thinking and action. After an individual is interested in a subject, then basic recognition of both the content and problematic nature of an issue can be developed. By recognition in the energy situation, we refer to recognizing characteristics about oneself and one's environment (and the relationship between the two) which help an individual to be an effective energy actor. However, in order to build constructive habits of behavior, an individual must also show concern about his or her role in a problem to be motivated to take action. The development of concern becomes the chief and highest objective in the awareness dimension.

Therefore, interest, recognition, and concern are the three process

OBJECTIVES

AWARENESS

1. Students will demonstrate interest in the ideas of energy conservation and alternative uses of energy, as well as their roles as energy consumers and citizen (group) problem-solvers.

2. Students will recognize fundamental energy resources, their use and distribution as well as the basic characteristics of their consumer and citizen roles.

3. Students will demonstrate concern by rating energy and their roles in the energy situation as high priority problems.

INFORMATION

1. Students will know and use the concept of resources (human and physical) in identifying energy problems in their own everyday environment.

2. Students will know and use the concept of outcomes (physical and human) in assessing solutions to energy problems in their own everyday environment.

INQUIRY SKILLS

1. Students will ask clear and significant questions about energy and their roles in the energy problem.

2. Students will gather evidence related to energy questions.

3. Students will articulate their values and apply them to energy situations.

4. Students will speculate about alternative futures in energy use and problem-solving.

PARTICIPATION HABITS

1. Students will practice consumer roles in energy situations in their everyday lives.

2. Students will practice individual and group decision-making roles in groups which are important to them in their home, school and community.

components of the awareness dimension on which we will focus here. They are processes because they involve the establishment or reorientation of basic attitudes and preferences. They are somewhat sequential in the sense that interest can be developed before recognition takes place, and recognition can occur before concern is developed. This type of natural sequencing will be the base on which curriculum materials will be built.

The content of the awareness competency is as important as its process components. We are not only concerned about developing interest, but focusing that interest on important topics. We will stimulate concern, but we will also want to direct that concern toward selected content areas. For our purposes here, awareness will be developed with two major content organizers. First of all, we will develop awareness about energy. We will develop students' awareness of energy resources, energy use, and the energy problem. Our second content organizer will focus on the roles individuals take. We want people to be aware of their role as consumers. They must be concerned about conservation and the use of new technologies. They must also be aware of the possible roles they can take as citizens within groups in problem-solving in the area of energy. Therefore, we will need to develop concern about group participation and group problem-solving activities.

Information. As with the awareness objectives, in the information, or knowledge, domain we want to teach concepts and facts relevant to developing effective energy actors. Considering the actor as the primary instructional focus for information competencies, two arenas of possible objectives become important. We want students to know some essential ideas about human behavior, otherwise habits and patterns of energy conservation and use cannot be developed and/or changed. We also want students to know

about energy resources and uses so that basic energy concepts can be used as an information base for action.[12]

Three concepts will constitute the primary focus of the curriculum materials. They are not concepts that are common to curriculum materials in the energy field, although they fit very well with the conceptual focus of the state social studies guidelines for Indiana.[13] These three concepts are derived directly from our goal of promoting effective energy actors. They are: resources, actions, and outcomes.

These concepts can be justified in the following ways. First of all, without information about human and energy resources, energy actors cannot be well informed or effective in taking action. They need to know what personal resources they have and what energy resources they use. Resources, then, becomes a fundamental concept that is more basic than factual information about a particular form of energy or transformation process. We are also concerned about the actions that are feasible for individuals to take, both as individuals and as groups. This fits into our concept of an energy actor as a consumer and a citizen. Finally, we are concerned with the outcomes of energy use and action taken by individuals. Without some concept of the relationship between use, actions, and their consequences, students will be blind actors and may aggravate rather than improve the energy situation.

By "resources" we refer to the human and physical resources used by people in their everyday lives. We are concerned with human resources, such as information, power, money, and votes which are put to use in energy problem-solving. We are also concerned with physical energy resources such as chemical, nuclear, geo-thermal, tidal, and solar energy. We are concerned about what these resources are and how these resources are

distributed; what human and physical resources must be utilized and how they must be utilized in order to promote effective action on the energy question.

"Actions" becomes a second important concept, because it is through actions that resources are used. Patterns of energy transformation and use are important information in this domain. It is also important for students to consider alternative courses of action that they can take to pattern their everyday lives. Therefore, actions are the way through which both human and physical resources are used. Actions and resources become interrelated concepts which are significant for understanding the energy problem.

The third important concept is "outcomes." We are concerned about the outcomes of human behavior, both in terms of individual and group action. We want students to understand how their actions can contribute to the resolution of energy questions and what the unintended consequences may be. We also want students to see how their use of physical resources contributes to the physical condition of the globe as a whole. In this sense, we are concerned about the physical outcomes of energy use. The problem is definitely global in scope, and students should be able to see linkages between resources, actions, and outcomes which will cause them to see how the patterns in their everyday lives have an immediate and indirect effect on the lives of others.

Inquiry Skills. There are some skills that are absolutely vital to effective action on energy problems. One such skill involves gaining information. No one can be an effective actor in any arena without certain basic skills in inquiring about what is happening. First of all, individuals must be able to ask good questions. If they cannot do so, they cannot

collect information and knowledge that will be useful to problem-solving. Secondly, they must be able to gather evidence and apply it to the questions that they ask. Without these fundamental inquiry skills, the pursuit of knowledge is only a rote learning experience, and the actor cannot utilize knowledge in any significant way. Therefore, we will teach basic skills in question-asking and evidence gathering as a fundamental part of studying the energy issue.

Another important inquiry skill in considering the energy problem is that of valuing. The energy problem involves essential value questions. Without some fundamental knowledge of their own values and how they apply to the energy situation, students cannot be effective energy actors. Students also need to be able to apply their values to their own everyday lives in response to energy questions and problems. Without these fundamental valuing skills, the energy question becomes one more academic matter. It is not that for elementary students, nor is it for actors across the globe. Therefore, basic valuing skills need to be taught.

We also want students to be able to see how their actions impact on the current situation and the situation in the future. Energy is a problem now, and will be one in the future. Unless some discussion can take place of alternative ways the future might turn out, given different plans for resolving the energy problem, students cannot comprehend the full utility of their actions, nor take a perspective which will be useful in problem solving. Therefore, some basic skills in identifying trends, projecting future consequences, and applying values to those futures will be taught at the K-6 level.

Participation Habits. Participation habits are not difficult to spot. Everyone can find patterns of individual and group activity in their

everyday lives. Carla Consumer regularly turned off lights. She also regularly participated as a member of a carpool. Most people have different types of habits from Carla. It is these habits we will try to change.

Because there is a need to develop and change patterns of people's everyday lives, participation habits are difficult to teach. We must be very selective about the participation habits we try to instill and give them time to be nurtured and developed through consistent and sustained activities. In this way, participation competencies are like awareness competencies. They must be powerfully persuasive, and they require continuous reinforcement.

Participation can be divided into two distinct, yet interrelated categories. The first involves the roles that individuals take. A role means behaving in a way which distinguishes you from others who do not behave in that way. Therefore, the President of the United States has a role as President that separates him or her out from others involved in the White House or in the population at large. In the same way, we can say that an effective energy actor has a consumer role which distinguishes him or her out from others who are doing different types of activities.

A consumer role is one which we all take everyday. We all consume energy products and use them on an hourly basis. This consumer role can be divided into three sub-roles. One is a consumer when one acquires a product, whether it is an energy product or another type of product. In this case, one takes on a type of shopper role. The human and physical cost consciousness which informs our energy shopping is a very important part of our role as consumers.

We all also take another sub-role, that of user. Whenever we shop

for a product, we normally intend to use it, not to put it on the shelf. The same is true with energy. We shop for energy and use it on a continuous basis. The efficient use of energy is another part of the consumer role. Knowledge of how to use energy and when to use it is key here.

A third and final sub-role which is important is that of energy disposer. Once something is used and it is no longer productive, it must be disposed of and new products must replace it. Decisions about when to replace energy products and how to dispose of the ire key types of consumer decisions that are made in this area.

Therefore, we can teach students about the role of being a consumer and include the role of shopper, user, and dispenser in teaching students key habits in their own everyday lives. We might liken world energy resources and products to a giant grocery store and teach students about selective shopping, utilization of products, and disposing of products in the same way their parents might teach them how to use their weekly grocery list.

A second important type of role is a citizen role. The citizen role is a more general one than that of a consumer. It involves working in groups. One is not a citizen unless one is a member of some entity. Therefore, citizen action is public, or group, action. Probably the most generic and useful role in group work is that of decision-maker. Groups are formed in order to make decisions. They act based on decisions. They have an impact based on how their decisions are implemented. Therefore, if there is one essential role that might be taught in an energy curriculum project, it is that of group decision-maker.

Each of these roles and skills involves levels of participation activity. Students need to practice modeling a role, either in class or out of

class. We will also want them to be able to apply the roles and skills that they learn in settings which are important in their everyday lives. Finally, we will want them to use the application experience in order to adapt roles to a variety of group settings and energy situations. Therefore, students will need practice in different levels of skills in order to thoroughly internalize them and transfer them effectively into their everyday lives.

For these activities to be successful, they must be as close as possible to school, family, and community situations which are important to students. We will try to integrate these skills into students' everyday lives in meaningful ways. The success of the objectives will depend on how well all four dimensions of awareness, knowledge, skills, and participation habits can be integrated and transferred to promote sustained behavior. In the short-run, we will hope that students will model Roger's behavior and a base will be set from which Carla's committments and actions will be a natural outcome.

Curriculum Plan

There are a variety of ways that the objectives stated above could be sequenced and orchestrated into curriculum materials. An experience I had the other day will highlight some of the motivating assumptions for the curriculum plan outlined here. I visited for an afternoon with two fourth grade teachers and their students in Bloomington. The teachers and I had a long talk about fourth graders. We also talked about energy education, elementary schools, and what Wednesday, May 10, 1978 was like in their fourth grade classroom.

Wednesday was not an unusual day. In fact, to an untrained eye such as my own, it looked like first grade had in another school on May 3, and

not unlike third grade on May 5 in still another school. The students resembled mountains and valleys from the back of the class. Their heterogeneity in size was only exceeded by their diversity of interests and cognitive and emotional development patterns. The girls continued to sit with the girls, the boys with the boys, and sex segregation carried over into "break time" and P.E. They concentrated on work for about twenty minutes, and then it was time to move on to any one of a variety of more active, interactive, and many times physical diversions.

Talking about and with the fourth graders underlined some important similarities and differences. The fourth graders rated sports high on their list of exciting things to do, a priority held high by almost every elementary student, although their interpretation of sports was not very institutionalized at this point. Sports was only a little higher than self and friends, but these two preoccupations, especially self, were clearly on the decline from the first grade. T.V. was becoming much more important, both in time devoted to viewing and as a socializer. "School" was clearly not very relevant as, even sitting in the classroom, it was not mentioned as part of the students' ratings.

When asked, fourth graders were more articulate about what did interest them in school than some of the younger students. As Barry told me: "When I see the point, it makes me feel good." What was the "point?" The point was a fact, an object, a feeling...a picture, praise from the teacher. The point was clearly concrete, manageable, and somehow relevant to Barry's needs and wants <u>on</u> <u>Wednesday</u>.

Susie added a dimension. "I like this science class," she said. "We do a lot of neat things. We collect rocks with fossils. I take care of our frogs...." <u>Doing a lot</u> was clearly a high priority.

The fourth grade teachers also had some points of view. They felt energy was an important social studies/science topic -- and should be taught as such. They wanted a clear, well-developed unit which they could teach as a unit. Activities which would integrate with other subjects were important, but they needed a core or a base, not a set of unrelated activities. The material needed to be creative, active, concrete, and fun -- then they would use it. Energy, or any other topic, was less important than the quality of the materials, measured by student learning and involvement.

The teachers also wanted to "see the point" of the materials. A clear rationale and objectives would help. Flexibility was key -- they felt they had 40 classrooms, not one. Grade level specifications were important, but recognition of differing interests and abilities was tantamount. Most fourth graders, they said, could do things that first graders could not, but there was wide variation and no real norm within or acorss classes.

Needless to say, the teachers and their students said many useful things. Wednesday was an intellectual treat for me. Personally, I will never forget Bruce. As I was leaving the classroom, he summed it all up for me. "Energy," he said with a smile, "we have a lot of that!" They sure do, I thought. They sure do.

Based on these types of experiences and some thinking and research, the plan for the materials includes several components. It will begin with a rationale which will provide teachers with a basic conceptualization of what the curriculum materials are intended to do. It will demonstrate how materials fit into the K-6 social studies/science curriculum. General objectives will be set out next. A set of well-integrated, social studies/

science lessons will be developed which will have short rationales and concrete objectives specific to each lesson. They will be hands-on lessons that can be used by teachers in elementary social studies and science classes. Each set of core lessons will be accompanied by adaptation exercizes for students of varying stages of development and for language arts and math subjects. Assessment activities will also be provided. Finally, the materials will include an annotated bibliography which will stress supplementary materials both for teachers and for students. A description of each part of the curriculum materials package follows.

Rationale and Objectives. A rationale will be provided at the beginning of the curriculum package. It will be directed to teachers. An overview of the materials will be provided. The conceptualization of an effective energy actor and the domains of objectives as they relate to the conceptualization will be presented. It will then list both general and specific objectives for the lessons. An outline will be provided which links lessons and objectives at various developmental and grade levels. Charts will be developed which show linkages between specific lessons in the guide and typical language arts and math lessons. Finally, typical sequencing patterns for the objectives will be discussed throughout the K-6 level.

The rationale will provide teachers with a working base for dealing with the curriculum materials. It will be just that, a base. Hopefully, it will be treated like a well-designed library shelf for new books. It will have clear order, without confining the user to any particular path. It will stimulate creative sequencing and diverse adaptations. The teacher will easily find what he or she wants, and perhaps discover something exciting and unexpected.

Lessons. The general energy curriculum is outlined on the following page. The curriculum is divided into four units, each representing a basic conceptual focus in the information objectives. Within each unit, awareness, information, inquiry skill, and participation habits are developed.

The units can be sequenced as they are here, or taught individually. For example, if a teacher wished to focus on "Energy in Action," references would be found for some necessary background activities from "Energy and You" and/or "Energy Resources." Teachers could also use smaller sections. A kindergarten class might wish to use only "Person Power." A fifth grade class might use only "Solving Energy Problems." Possible sequences are infinite. Necessary cross-referencing will be a major facet, and strength, of the package. In toto, the materials will cover a possible K-6 sequence of 6-8 weeks for each grade level.

Specific lessons will be developed for each segment of the curriculum. They will be core social studies/science lessons. The activities within the lessons will be differentiated grade or ability level. With each core lesson, a set of adaptation lessons will be keyed for language arts and math applications. Therefore, teachers will use a core lesson with one or more adaptations depending on their interests, needs, and particular class characteristics. We hope this format will promote both structure and flexibility for the use of the materials in elementary classrooms.

It may be helpful to outline a sample lesson to show its content and fit to a sequence. Suppose that we have a lesson which focuses on the interest dimension of awareness in the section on "Person Power" within "Energy and You." The lesson would begin with a short, one-page rationale for the teacher which would include a statement about how this particular

CONTENT OUTLINE

I. Energy and You

A. Person Power. Basic awareness activities. Identification of physical and human resources which are part of students' everyday lives. Personal energy inventory.

B. Energy in Your Community. Basic awareness, information, and inquiry skill activities (question-asking). Identification of physical and human resources in local environment. Community energy survey.

C. The Energy Problem. Basic awareness, information, and participation activities. Key dilemmas introduced by short case studies. Students see concerned actors make a difference.

II. Energy Resources

A. What is Energy? Continue awareness. Information about human and physical resources and relationships. Introduce evidence gathering skill. Resources of different types of energy actors.

B. Using Energy Resources. Awareness. Information about how resources are used. Apply evidence gathering skills. Consumer role in relation to use.

C. Distributing Energy Resources. Develop information and concern over patterns of use. Apply evidence gathering skills. Decision-making skill in relation to distributing resources.

III. Energy in Action

A. Energy Coming and Going. Focus on energy transformations -- sources to products. Develop interest. Develop citizen role. Students do experiments and map physical and human historical and physical origins of energy use.

B. Solving Energy Problems. Recognition of important problems. Apply action processes to community, etc. Develop valuing skills. Group decision-making skill as part of citizen role and problem-solving.

C. What Can We Do? Develop concern and concrete action alternatives. Model personal and group case studies. Practice valuing skills. Major individual/group/class project to apply information, inquiry skills, participation.

IV. Outcomes: What Difference Does It Make?

A. Environmental Outcomes. Awareness of positive and negative effects of use for physical environment. Information about outcomes. Develop data and trends for forecasting skill. Stress personal adaptations of consumer and citizen roles.

B. Outcomes for People. Recognition of positive and negative effects of use for personal/economic-social-political environment. Information about outcomes. Develop data and trends. Stress personal adaptations of consumer and citizen roles.

C. Energy and the Future. Focus concern on short and long run futures. Apply forecasting skill to self, community, etc. Stress personal and group decision-making adaptations.

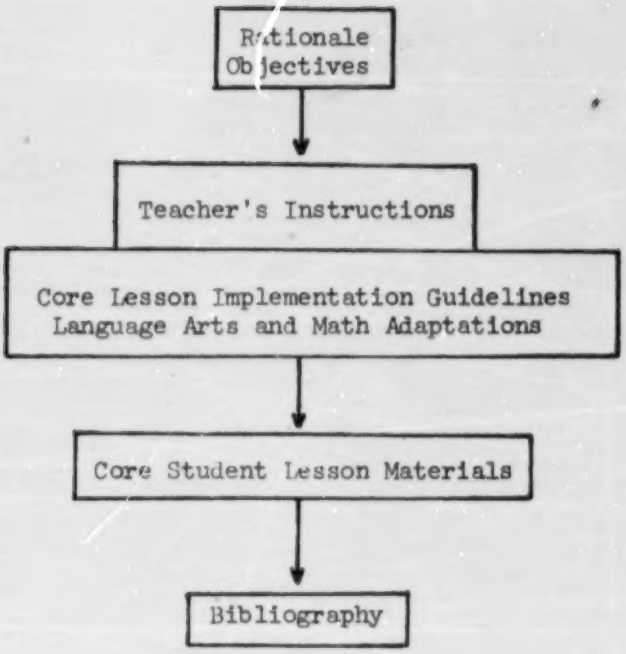
lesson ties into the conceptualization of effective energy actors and which would specify its objectives. One objective could be for students to be able to demonstrate interest in energy issues through the development and use of a personal energy inventory.

The one-page rationale would be followed by one or two pages of teacher's instructions. These instructions would provide specific guidelines for implementing the basic lesson. Alternative ways of implementing the lesson across K-6 levels would also be highlighted. Finally, instructions for use of adaptation lessons for language arts and math classes would be outlined.

The core lesson which would follow would be a social studies/science lesson. It would focus on students' personal energy resources and their use.

On pages following the core lesson, adaptation suggestions would made. For example, adaptations to reading lessons might be included which would have students read and/or develop questions for the inventory. Adaptations might include a math lesson which would involve counting or tabulating the results of the inventory for some group or the class as a whole. Students could do straight functional counting in this lesson, or draw graphs and develop charts of the responses. A teacher could use it directly with students in the class. The lesson would conclude with a short bibliography for the teachers of reference and instructional sources which could easily be used with the lesson.

The figure below illustrates the basic format for lessons like the one from "Person Power:"


Rationale
Objectives
Teacher's Instructions
Core Lesson Implementation Guidelines
Language Arts and Math Adaptations
Core Student Lesson Materials
Bibliography

This type of lesson would be grouped with six others focusing on person power. It is clearly an introductory lesson at the first level of difficulty for students. Teachers might choose an instructional sequence which included all of these types of lessons in "Person Power." They would use these six lessons with their class before moving on to other lessons. They might, however, decide that students were really interested and they need not have further lessons on the topic that would help to create awareness. They could then move on to an alternative instructional sequence including knowledge, skill, or participation domains in "Energy in Your Community" or "What is Energy?" The figure on the following page illustrates lesson ideas and the two possible sequences.

These are two major ways that teachers could create a sequence of activities using the package. There are many more. Hopefully, there will be an artful blend of structure and flexibility, as well as a strong cross-referencing system. As they stand, the lessons should stimulate maximum use and fit to the objectives and to the elementary curriculum.

Bibliography. A bibliography will be placed after each lesson and in a major section of the package at the end. The concluding bibliography will compile all of the suggestions from all of the lessons into categories. There will be reference material for teachers, print material for students, as well as audio-visual supplementary aids that can be used in classrooms. Finally, one important section of the bibliography will include community resources which can enhance classroom teaching. The bibliography will help teachers to extend their own knowledge and lessons for classroom use beyond the package itself.

TWO POSSIBLE SEQUENCES

PERSON POWER: SEQUENCE I

LESSON 1: YOU HAVE ENERGY!
Students use their own physical energy resources as they move objects in the classroom and discuss prepared pictures/cases.

LESSON 2: YOU USE ENERGY
Students see a variety of personal energy sources--body, mind, spirit, interactions with others--as they do personal/class inventories

LESSON 3: ENERGY AROUND YOU
Students become aware of energy in their environment--solar, nuclear, etc., as they explore places in their school, home, community, where energy is used.

LESSON 4: TAKING CARE OF ENERGY
Students learn about the importance of conservation of personal and environmental energy as they see what it would be like to "do without" various necessities for a short period.

LESSON 5: THERE IS MORE THAN ONE WAY
Students explore different ways to take care of their own energy and that which is shared with others through a class/school conservation hike.

LESSON 6: YOUR ENERGY PLAN
Students develop concrete plans for saving and using energy in their everyday lives.

PERSON POWER: SEQUENCE II

LESSON 2: YOU USE ENERGY
Students see a variety of personal energy sources--body, mind, spirit, interactions with others--as they do personal/class inventories.

LESSON 3: USING ENERGY RESOURCES: ENERGY CONSUMERS
Students learn about various consumer roles they can/do play. They also study community actors. They put together a plan for how community actors could help solve some important energy problems.

LESSON 4: ENERGY IN YOUR COMMUNITY: A COMMUNITY ENERGY MAP
Students study/visit various settings in their community to see how energy is used. They draw a large energy map and analyze energy problems.

LESSON 5: YOUR COMMUNITY
Students develop a project for helping to solve one problem in their school or community. They practice consumer and citizen roles in problem-solving and help to implement solutions.

LESSON 2: OUTCOMES FOR PEOPLE: ECONOMIC OUTCOMES
Students learn a variety of ways energy use affects people's wealth, work, and economic choices. They study the impact of some alternative energy use plans on their own school or community. They re-evaluate their own energy conservation plans for their community in terms of economic impact.

Assessment. All of these features -- rationale and objectives, lessons, bibliography -- should help teachers to provide a rich learning experience for students. Yet teachers need more than this in order to adequately use and assess the impact of the materials. One important dimension of the package will focus on assessment. Three types of assessment instruments will be created: 1) a general pre-test; 2) evaluation activities; and 3) a general post-test.

The pre-test will provide a mechanism for assessing students minimal competencies as effective energy actors. It will assess their awareness, information, inquiry skills, and participation habits. It will not be a vocabulary test. It will be a general, short questionnaire which any teacher could use to assess his or her students' competencies as effective energy actors. If a teacher found, for example, that students had already acquired inquiry skill competencies, these lessons could be skipped or extended.

The evaluation activities will be tied specifically to the instructional objectives. A set of activities covering the objectives for each sub-section of the package will be constructed (i.e. "Person Power"). The evaluation activities will be just that -- puzzles, stories, dialogues, projects. They will help teachers to see what students can do in a non-testlike situation. They can also serve as supplemental lessons for teachers who wish to use them.

The post-test, like the pre-test, will be a general assessment of students' competencies as effective energy actors. It will be useful for any energy materials aimed at this goal. It will provide a more extensive and higher level view of student achievement, and will have a key which will provide useful translations of scores for administrators and parents,

as well as teachers themselves.

Each of the dimensions of the curriculum package should contribute to a viable program in energy education for elementary grades. The rationale will present important background and planning information. The lessons will contribute direct teaching aids. The assessment instruments will be a means for demonstrating student competencies. The bibliography will promote extensions beyond the package itself. Hopefully, both students and teachers will be challenged by the energy problem and moved to act in significant ways to seek solutions. Ideally, this type of program could also serve as a model for other topical programs in the elementary curriculum and the general objectives could stimulate a multiplier effect across subject areas which would enhance learning and, as important, acting on important public issues.

Dissemination and Evaluation

Back many pages ago, I talked about the Energy Education Curriculum Project as including more than a set of instructional materials. To some this is obvious. To others, this approach may need explanation. John Kennedy explained the approach far better than this author ever could. In his 1960 speech accepting the Democratic presidential nomination, he said:

> "The New Frontier of which I speak is not a set of promises--it is a set of challenges. It sums up not what I intend to offer the American people, but what I intend to ask of them."

In a sense, the Project offers a set of instructional materials. Kennedy would say that this is only half of the equation for success in any major effort. The other, larger half has to come from the people in schools. They have to use the materials, and use them successfully. In order to do that, they need to accept and implement curriculum changes.

Too many people think that offering ideas and materials is the key to change. It is only the beginning. Evaluation and disemination are both crucial steps. Successful evaluation requires sharing ideas and taking criticisms that are given by people in schools. Evaluation must be a two-way process, or it will become mere propaganda. The information that the sharing provides is essential for both revisions and use. Similarly, successful dissemination involves two-way participation. Unless people can question and become involved, model and participate, short-term changes will be quickly displaced by more familiar patterns of thinking and teaching.

Carving out this two-way street requires careful planning and stamina, flexibility and sensitivity, perception and conviction. That is the challenge of the energy education frontier. That is why there is a need for simultaneous development, dissemination and evaluation activity. We cannot just offer, we have to work together at acceptance and use.

Dissemination Activities. A brochure needs to be developed so that people can find out about the project and the materials that are being developed. They will also be asked to participate in Project activities. Second, presentations need to be made at professional meetings so that teachers have the opportunity to hear about the materials, to ask questions and to see sample lessons. A set of articles need to be strategically placed in journals so that social studies educators can learn about basic ideas, know where to turn when they receive requests for information about energy materials, or when they want to use materials for teacher training. This minimal plan for dissemination should begin at the onset of the development of curriculum materials, so that by the time the materials are completed and ready for use, work has been done which makes widespread

use of the materials a reality.

Workshops for teachers also need to be conducted. The Indiana Department of Public Instruction is currently planning a series of workshops for elementary teachers across the state in the fall.[14] The curriculum package will be designed with these workshops in mind. There will be selected lessons which will serve as models for aspects of the curriculum. The lessons will be designed so that they can be used in the classroom, but also so that they can guide workshop activities.

Therefore, the curriculum package will serve two purposes. First, it will provide useful lessons for teachers in the classroom. Secondly, it will serve as a basis for workshop activities which will acquaint teachers with the materials. The plan for workshop use will be explicit and simple enough that any teacher can use it within his or her own school to acquaint other teachers with the materials. In this way, dissemination activities and will produce a multiplier effect among teachers across the state and beyond.

These types of systematic activities form a core for a much more serendipitous dissemination effort to inform people about energy needs and to begin a dialogue about possible solutions to energy problems. It is our intention to reach as many people -- young or old, in schools or outside schools, active or passive -- as possible with our ideas. Articles will be placed in a wide range of popular print media, including both newspapers and magazines. Work will be initiated with news broadcasters and children's educational television programs. Only in this way can we promote the general multiplier effect, which will make a real impact on educational problem-solving in the energy area. Only then will we fully utilize the curriculum medium to promote educational change.

Evaluation. The evaluation component of the Project is as important as the development or dissemination efforts. It is important that a systematic and simple evaluation be done in order to obtain data which will improve the integrity and workability of the instructional materials. It is also important that the evaluation be multi-faceted, so that one type of data can augment other types. The evaluation procedure proposed below will have two major parts. First of all, a consultant network will make policy decisions as well as provide critiques and advice on both the conceptualization and the instructional materials. Second, there will be a pilot test which will involve a small number of selected schools in order to determine the workability of the materials in elementary classrooms.

The evaluation will involve a wide range of consultants. Input needs to be sought from professional educators, people who are involved in the energy problem outside of education, practitioners in the schools, including teachers and administrators, and students in the classroom. Face-to-face meetings with consultants over the conceptualization and sets of lessons will offer important criticism and avenues for revision in each phase of curriculum development.

A core group of consultants will be formed at the Indiana Department of Public Instruction. Other consultants will be brought in to these group meetings as needed. Advice from other groups and individuals concerned about energy education will also be sought independently of the meetings.

A series of meetings will be held with teachers and students from a variety of areas in Indiana in order to assure the workability of the materials. Meetings with teachers from a wide range of types of schools and demographic areas of the state are necessary. It is important that

these teachers have not been involved in this type of consultant activity previously, so that their own experience can be enriched and the curriculum materials will reflect what an average teacher wants to work with and use.

A crucial part of the evaluation involves pilot tests. We will need to use pilots during July, August, and September, when most schools are not in session. We will need to have at least seven schools selected, one from each grade, K-6. These schools will reflect the demographic composition of the state and the ethnic and racial composition of its school population, as these variables are particularly important in the development of workable curriculum materials.

Pilot teachers will not necessarily teach the entire program. They will teach prototypic segments of the program and evaluate its effect in two to three days worth of lessons. Therefore, teachers need not interrupt their normal activities for a lengthy period in order to test the materials. Questionnaire data will be gathered from pilot teachers. Site visits are also necessary in order for developers and consultants to see the workability of the materials in classrooms and to have face-to-face conversations with teachers and students utilizing the materials.

These facets of the evaluation can be carried out carefully and simply in order to provide important data feeding into revisions. We will gather questionnaire data and interview material which will be summarized in the rationale section of the instructional package. The evaluation will also provide useful information for teachers attending dissemination workshops and other potential users of the materials.

Our responsibility to systematically evaluate our work and to provide information about its strengths and weaknesses extends beyond those who

will use the materials in classrooms. An evaluation report will be developed which can be shared with school decision-makers, parents and the general public. Our desire is to inform, but also to educate and re-establish a basic exchange of ideas across important groups in the school community. In this way, evaluation and dissemination efforts are wedded together at a fundamental level. This marriage should amplify the general impact of our efforts.

Conclusion

The Energy Education Curriculum Project is designed to provide important outcomes for a range of people involved in energy education. We believe that students will benefit by the materials because they will gain competencies in energy use and conservation which will aid them in developing important habits and patterns of everyday living. We also believe teachers will benefit from the materials. Their own energy awareness will be increased, the materials will be an important addition to the social studies/science curriculum, and they will integrate together language arts and math offerings. Hopefully, teachers will enjoy teaching the materials, and become more effective energy actors themselves as a result.

School systems will gain an important addition to the curriculum which will provide active involvement with family and community agencies. The loss of "community" over the last decade is one of the problems of a modern, technological society. The school has always been one important focus for that sense of community. It will be fostered and expanded through the use of these materials. Schools can thus become a linchpin for changes in patterns of energy consumption in communities, and a base for the continuing education of all community members.

Beyond the local community, the materials should be disseminated such that schools across the country can use them and groups involved in energy education at state and national levels can find the materials useful. Adaptations of the materials can also be useful for community organization work and mass education regarding the energy problem.

These are the projected direct outcomes of the curriculum materials. There are many indirect extensions of this work which can be built from this particular base. The most natural and logical outcome would be continued instructional development at the middle/junior high grades and high school level. Energy education materials are lacking at all levels of the curriculum. Any of the domains of objectives can be extended in order for firm habits to be built at crucial years in the cognitive and social development of pre-adolescent and adolescent students.

Another natural outcome of developing the materials is to go beyond a set of dissemination workshops in the state of Indiana with a full scale dissemination plan which would involve working with educational associations across the country in implementing these materials. There is no reason to believe that elementary teachers across the United States should not gain important benefits from materials developed in Indiana. Working with elementary teachers associations, school board associations, and principals would help not only improve the elementary curriculum, but make schools themselves less energy intensive in their consumption and better community educators for the present and the future.

The links between the school and community which are necessary for this Project can form a base for pilot projects which would involve community energy policies. Pilot projects which would focus on school-community linkages across service groups, government, public utilities, and

corporations, would encourage community efforts at energy conservation. These projects could provide the cement for long-term awareness and action in the energy area.

Finally, schools might contribute to energy conservation in one easy and important way. Local school districts could run a contest or campaign through their local radio D.J.'s. Students could monitor energy consumption and could become involved in pointing out energy conservation measures in the community. Prizes could be awarded for school districts which promote the most energy conservation. This is one small way an entire community could get together around the idea of conserving energy. In this case, there would be no losers. All communities would be conserving energy. Students would become more involved in community planning and policy, and establish models and norms which would be shared by important adult figures as well as their peers.

These are some of the potential outcomes of the Energy Education Curriculum Project. Reaching our goals depends on reaching people who want to share criticisms, ideas, and experiences. If you would like to help in our work, please share your reactions with me at the Energy Education Curriculum Project, Social Studies Development Center, 513 North Park Avenue, Bloomington, Indiana 47401. This is not an offer, but an initial request. It is the beginning of what I need to ask of you to begin to build our two-way energy education street.

FOOTNOTES

1. "Public Remains Unconvinced of Energy Problem," Gallup Opinion Index, 149, December, 1977, p. 15.

2. Ernest L. Boyer, "The Energy Agenda of the U.S. Office of Education," in Council for Education Development and Research, Education Confronts the Energy Dilemma, Oak Ridge, Tennessee: Technical Information Office, U.S. Department of Energy, 1977.

3. Robert Weissberg, "The Politics of Political Socialization," Youth and Society, 8:2, December, 1976, p. 117.

4. A good summary of the literature on the impact of schools on students' attitudes and behaviors can be found in Lee H. Ehman, "The Function of the School in the Political Socialization Process: American Findings," paper prepared for the International Conference on Political Socialization and Political Education, Tutzing, West Germany, October 10-14, 1977.

5. A brief and incisive history is provided by R. Freeman Butts, "Historical Perspective on Civic Education in the United States" in National Task Force on Citizenship Education, Education for Responsible Citizenship, New York: McGraw Hill, 1977, pp. 47-68.

6. One excellent example of a successful attempt to fulfill these three goals in the civics curriculum at the elementary level is Lee F. Andersen, ed., Windows on Our World, Boston: Houghton Mifflin, 1976.

7. Robert M. Jones and John E. Steinbrink, A Survey of Precollege Energy Education Curricula at the State Level, Houston: The Energy Institute, University of Houston, 1978.

8. Jones and Steinbrink, ibid., pp. 6-8. We think one of the better sets of materials which takes awareness into consideration are those developed for the Iowa Department of Public Instruction. See Ruth Bakke, Energy Conservation Activity Packets, Des Moines, Iowa: Iowa Department of Public Instruction, n.d.

9. John Dewey and others have focused on this idea. For an explanation of the authors rationale for integrating knowledge, skills, and participation see Judith A. Gillespie and John J. Patrick, Comparing Political Experiences: An alternative Approach to Government Instruction, Washington, D.C.: American Political Science Association, 1974.

10. Jones and Steinbrink, op. cit., p. 8.

11. The early works of Piaget are especially important here, including The Language and Thought of the Child, New York: Harcourt Brace, 1926. So are later works, including Memory and Intelligence, New York: Basic Books, 1973.

FOOTNOTES (continued)

12. Considering both human behavior and energy as twin conceptual fear for the curriculum is a unique approach to energy education. Most materials stress basic scientific concepts involving energy resources, transformations, and uses. Ours cannot do this because goal of developing effective energy actors involves changing human behavior. The entire conceptual focus of the curriculum is changed as a result. The curriculum materials developed by the National Science Teachers Association, Project for an Energy-Enriched Curriculum, Oak Ridge, Tennessee: U.S. Department of Energy, 1977.

13. See Social Studies: A Guide to Curriculum Development, Indianapolis: Indiana Department of Public Instruction, 1978, pp. C1-C9. The concept fit is particularly strong on basic ideas such as behavior, citizenship, decision-making, environment, motivation, resources, and roles.

14. Indiana elementary teachers who would like to participate in Indiana regional workshops in the fall, 1978 should contact the author. Workshops will be held in local sites across the State.